

The Lake Chad Bird Migration Project: Malamfatori revisited

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Le bassin du lac Chad, situé en grande partie dans le Sahel, est un site important pour les migrateurs paléarctiques qui traversent le Sahara pour hiverner en Afrique occidentale et centrale. Un projet international, ayant pour objectif d'étudier le comportement et la condition physique des oiseaux migrateurs juste avant et après leur traversée du désert, a été mis en œuvre à Malamfatori, au Nigéria, sur la rive occidentale du lac Chad, avec des participants venant de Suède, d'Allemagne, d'Angleterre, de Finlande et d'Italie. En février–mai et août–novembre 2000, et pendant un voyage de reconnaissance en avril 1999, 5.822 oiseaux, dont 3.982 migrateurs paléarctiques, ont été capturés, et leur mensurations, poids et niveau d'adiposité notés. L'analyse des données collectées est actuellement en cours et fera l'objet de publications sur la mue, la taxonomie et le zoogéographie des migrateurs. Pendant l'exécution du projet environ 300 espèces d'oiseaux ont été observées, dont huit étaient nouvelles pour le Nigéria. Ces dernières, qui seront documentées séparément, comprennent l'Aigle pomarin *Aquila pomarina*, l'Aigle des steppes *A. nipalensis*, l'Engoulevent doré *Caprimulgus eximius*, l'Engoulevent à collier roux *C. ruficollis*, la Rousserolle verderolle *Acrocephalus palustris*, la Prinia aquatique *Prinia fluviatilis*, le Cratérope fauve *Turdoides fulvus* et l'Étourneau caronculé *Creatophora cinerea*.

The Lake Chad basin, which is situated largely within the dry Sahel zone immediately south of the Sahara, is a major topographical feature of the northern savannas of Africa (Fig 1). The lake is of regional climatic significance and an important focal point for Palearctic migrants that cross the desert to winter in West and Central Africa. Many continue their migration south after refuelling in the Sahel, but

these savannas are the final winter destination for millions of Palearctic breeders. Around Lake Chad species such as Ruff *Philomachus pugnax*, Yellow Wagtail *Motacilla flava*, Sand Martin *Riparia riparia* and Common Whitethroat *Sylvia communis* are, during periods of the European winter, as abundant as any resident African species, with the possible exception of Sudan Golden Sparrow *Passer luteus* and Red-billed Quelea *Quelea quelea*. The area surrounding the lake is of equal importance for northbound migrants in spring. Many species arriving from the south remain for some time to gain fat reserves (principally by taking saltbush *Salvadora persica* berries), before flying across the Sahara and the Mediterranean.

During recent years, partially under the European Science Foundation's 1994–96 network programme 'Spatio-temporal course, ecology and energetics of Western Palearctic–African songbird migration'^{3,4} much new work has been undertaken south of the westernmost Sahara, at Djoudj in Senegal^{13,16,17,19} and at Ginak in The Gambia^{11,12}. However, with the exception of field work performed in Ghana^{5,10} and Nigeria²³ almost a decade ago, and some within the Sahara itself^{1,2}, there have been no recent bird migration studies in, or south, of the central Sahara.

During the concluding meeting of the European Science Foundation's network programme, held at Sempach in Switzerland, in February 1997, it was suggested that field work be undertaken along the central flyway. Stephen Rumsey (UK) and CH (Sweden), with support in Nigeria from A P Leventis and PH, agreed to undertake this. Reconnaissance trips



Figure 1. Map of Africa showing the position of Lake Chad

were made in November–December 1997 and November 1998: the first surveyed the northern area between Kano and Lake Chad, the second concentrated on the area immediately west of Lake Chad.

During both reconnaissance trips the old fishery research station at Malamfatori, at the edge of the northern lake basin in extreme north-east Nigeria, was visited. In the late 1960s, this was the base for the British Ornithologists' Union (BOU) expeditions working on Palearctic migrants^{6,8}. At that time, the station was on the lake's shore, but it is now surrounded by farmland at the edge of *Acacia* woodland, which colonised the area after the northern basin dried out during the drought of the 1970–1980s (Fig 2). Agricultural, rather than fisheries studies, are now the focus of the station.

Following the reconnaissance visits, it was decided to use Malamfatori as a base for bird migration studies, principally because of the abundance of *Salvadora* in the area and the available accommodation. A building was placed at our disposal by the Lake Chad Research Institute, which we renovated

(Fig 3). The facilities include running (artesian) water and generator-driven electricity. The project also has two four-wheel-drive vehicles through the generosity of A P Leventis.

Spring 1999

During 1 to 26 April 1999 a pilot ringing study was initiated, to assess if the area around Malamfatori was still as suitable for such work as in the 1960s, especially given that the lake was now some distance away. This was undertaken by a team of Swedish, English and German ringers, and backed up by an Italian bird-ringing project performed simultaneously on several small islands in the central Mediterranean^{15,18}, in which Swedish effort has previously focused on the bird observatory on Capri¹⁴.

In all 1,307 individuals were ringed at Malamfatori in April 1999, comprising 782 Palearctic migrants of 19 species and 525 individuals of resident African species. The dominant Palearctic migrants were Common Whitethroat (650 ringed), Sand Martin (60), Sedge Warbler *Acrocephalus schoenobaenus* (20) and Com-



Figure 2. Lake Chad during its driest period, in the late 1970s, with water remaining in only the deepest parts of the southern basin, close to the Chari River mouth. The dark area shows the size of the lake at its greatest in the mid-1960s. The river entering the northern basin from the west is the Komadougou Yobe, which constitutes the border between Nigeria and Niger. Malamfatori lies at the edge of the lake basin just south of this river, and during spring 2000 water was only 2 km from its mid-1960s shoreline here. Note the sand dunes throughout the shallow basin, created during dry periods (Ulf Ottosson)



Figure 3. The bird observatory at the Lake Chad Research Institute compound south of Malamfatori (Ulf Utosson)

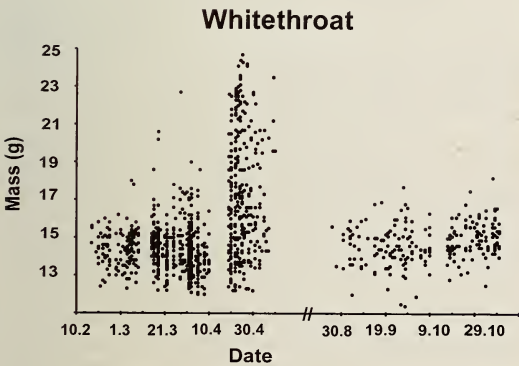


Figure 4. Body weights of Common Whitethroat *Sylvia communis* plotted against date.

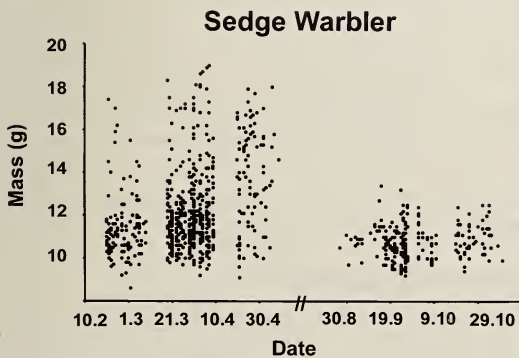


Figure 5. Body weights of Sedge Warbler *Acrocephalus schoenobaenus* plotted against date.

mon Redstart *Phoenicurus phoenicurus* (11). Common Whitethroats and Common Redstarts were caught among *Salvadora* bushes, the berries of which largely ripen during spring migration. Sand Martins were caught in mist-nets placed in the open, as they migrated on a broad front on most mornings. Sedge Warblers and several other water-dependent species were caught close to the advancing lake, c6 km from the station.

The main project 2000

It appears that rainfall is increasing again and because of this the water level in Lake Chad has been slowly rising; by spring 2000 the water was within 2 km of the old fishery station. Only 20 years before, in 1980, the lake was c120 km away (Fig 2); if this trend continues, the water may soon reach the old Malamfatori jetty.

The main field campaign of the Lake Chad Bird Migration Project was undertaken in 2000, in February–May and August–November, led by UO and Rolf Gustafsson (Sweden), and using personnel from Germany, Finland, Italy and Sweden. A total of 4,492



Figure 6. River Prinia *Prinia fluviatilis* (Ulf Utosson)



Figure 7. Marsh Warbler *Acrocephalus palustris*. Malamfatori, Nigeria, 16 September 2000 (Ulf Utosson)

individuals was ringed, of which 3,200 were Palearctic migrants. Trapping was performed at both a dry site with *Salvadora* bushes and at a wet site near the rising lake. During spring, Common Whitethroats and Sedge Warblers were again the principal species caught and constituted almost 90% of Palearctic birds ringed. In autumn, species diversity was much greater, though Common Whitethroats and Sedge Warblers were still the most numerous (see Appendix 1).

The main aim was to study migratory ecology of trans-Saharan migrants with the improved methods of analysis currently available. Of particular interest was how birds fatten up in spring (berries, insects, physiological adaptation etc.) and the spatial pattern of departure by different species, age and sex groups. In autumn, we studied the sequence in which species arrive, how they restore fat reserves following the desert crossing, and when those not wintering in the Sahel proceed south. Much of this information is still unknown. Other areas of interest were the DNA characteristics of different populations of various species migrating through the area, and the diseases birds possess.

Results

Some data are currently under analysis, but others have been utilised in a number of publications. One study, by Waldenström & Ottosson²¹, illustrates the difficulty in sexing Common Whitethroat. By comparing the sex determined by the ringer with that from DNA tests, it is demonstrated that many individuals are incorrectly sexed and that without DNA analysis such results would be wholly misleading. Another study by the same authors²² demonstrates that winter moult of Common Whitethroat in Nigeria is intermediate between those patterns described for western and eastern races, and thus resembles the split-moult pattern described, for example, in Banded Warbler *Sylvia nisoria*⁹ and could be interpreted as being halfway between a summer and winter moult. Further data analysis is being undertaken on fattening and preparation for trans-Sahara and Mediterranean flights, on stopover ecology, moult in both Palearctic and African species, bird malaria and population systematics. Figs 4–5 depict spring and autumn body masses for Common Whitethroat and Sedge Warbler. Winter weight of *Sylvia communis* is c13 g and individuals commence fat storage in March, completing this in April by which time body weight may have almost doubled. Winter weight of Sedge Warbler is c10 g and, as with Common Whitethroat, is almost doubled before spring departure.

Recoveries and retraps

Since the start of the programme, in 1999, there have been a surprising number of retraps of individuals ringed by our team and by others, as well as several recoveries. Of the 1,840 Common Whitethroats ringed, four have been recovered, in Tunisia, Libya, Egypt and Poland (the BOU expedition in the 1960s yielded two recoveries from Libya and one from Egypt⁷). Additionally, four ringed by us were retrapped at Malamfatori following at least one crossing of the Sahara. Of the 1,057 Sedge Warblers ringed, three controls were made of individuals ringed in Finland, Estonia and Hungary. Also, two Reed Warblers *Acrocephalus scirpaceus* were retrapped at Malamfatori, one from Yugoslavia and one from Italy. The latter was incredibly trapped by the same person who had originally ringed it, Ariele Magnani.

New birds to Nigeria

Given our intensive fieldwork over many months in an area subject to very little ornithological research during the past 25 years, it was unsurprising to discover several new species for Nigeria. Lake Chad lies at the border between West and East Africa, with their slightly different bird faunas, increasing the possibility of discovering species at the extremes of their range. At least eight additions to the Nigerian list were observed, some of which may even prove to be regular in the area (eg Steppe Eagle *Aquila (rapax) nipalensis* and Golden Nightjar *Caprimulgus eximius*), while River Prinia *Prinia fluviatilis* (Fig 6) is almost certainly resident. Two Marsh Warblers *Acrocephalus palustris* were caught (Fig 7); the species had only once previously been recorded in West Africa^{7,20}. The other new species were Lesser Spotted Eagle *Aquila pomarina*, Red-necked Nightjar *Caprimulgus ruficollis*, Fulvous Babbler *Turdoides fulvus* and Wattled Starling *Creatophora cinerea*. Full details of these are to be published separately. Several Afrotropical species and Palearctic winter visitors are more common than previously considered, eg Ferruginous Duck *Aythya nyroca*, Long-legged Buzzard *Buteo rufinus*, Booted Eagle *Hieraaetus pennatus*, Grey-backed Fiscal *Lanius excubitoroides* and Black-headed Gonolek *Laniarius erythrogaster*. Also, species of a more easterly origin, such as Isabelline *Lanius isabellinus* and Masked Shrikes *L. nubicus* were recorded on several occasions.

Acknowledgements

Thanks are due to A P Leventis for logistical support, without which the project would have been less feasible; the Wetland Trust (UK), Hasselblad Founda-

tion, Carl Tryggers Foundation and Friends of Ottenby Bird Observatory (Sweden) for financial support; and the Lake Chad Research Institute, in Maiduguri, for permitting us to use the facilities at Malamfatori. Its local director, Josiah Ozue and his staff gave their full support to the project. We also thank all those who have participated in the project: Daniel Bengtsson, Rolf Gustavsson, Patrik Rhönstad, Martin Stervander and Jonas Waldenström from Sweden, William Velmala from Finland, Frans Bairlein, Jochen Dierschke, Joachim Hoffman, Hans Dieter Martens, Roland Neuman and Mathias Putze from Germany, Ariele Magnani and Fernando Spina from Italy, and David Fletcher, Alan Martin, Stephen Rumsey and Trevor Squire from UK. The local army commander, Major Joshua Gidon, offered his support and the Bornu State Police Force providing security in the field. Finally, Mr Mari Madu, the former Federal Director of Forestry, in Maiduguri, organised the house renovation and much other valuable assistance. ♀

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Appendix 1. Total numbers of birds ringed during the Lake Chad Bird Migration Project.

Taxon/Scientific name	April 1999	spring 2000	autumn 2000	Total
Common Whitethroat <i>Sylvia communis</i>	690	929	261	1880
Sedge Warbler <i>Acrocephalus schoenobaenus</i>		703	334	1037
Olivaceous Warbler <i>Hippolais pallida laeneni</i>	95	174	92	361
Reed Warbler <i>Acrocephalus scirpaceus</i>	1	129	24	154
Lesser Whitethroat <i>Sylvia curruca</i>		38	99	137
Beautiful Sunbird <i>Cinnyris pulchella</i>	39	35	40	114
Great Reed Warbler <i>Acrocephalus arundinaceus</i>	3	99	10	112
Sudan Golden Sparrow <i>Passer luteus</i>	72	17	23	112
Subalpine Warbler <i>Sylvia cantillans</i>		13	89	102
Red-billed Firefinch <i>Lagonosticta senegalae</i>	60	17	17	94
Sand Martin <i>Riparia riparia</i>	60	28		88
Pygmy Sunbird <i>Hedydipna platura</i>	25	18	36	79
Garden Warbler <i>Sylvia borin</i>	4	15	50	69
Winding Cisticola <i>Cisticola gracilirostris</i>	4	33	28	65
Bleating Warbler <i>Camaroptera brachyura</i>	15	26	22	63
Yellow Wagtail <i>Motacilla flava</i> ssp.	6	40	9	55
Vitelline Masked Weaver <i>Ploceus velatus</i>	24	10	19	53
Wood Sandpiper <i>Tringa glareola</i>	9	40	2	51
African Reed Warbler <i>Acrocephalus baeticatus</i>	23	8	16	47
Black Scrub Robin <i>Cercotrichas podobe</i>	15	13	19	47
Lesser Swamp Warbler <i>Acrocephalus gracilirostris</i>		16	28	44
Rufous Scrub Robin <i>Cercotrichas galactotes</i>	7	11	21	39
River Prinia <i>Prinia fluvialis</i>	1	26	12	39
Yellow Wagtail <i>Motacilla f. flava</i>		25	12	37
Melba Finch <i>Pytilia melba</i>	14	5	16	35
Northern Crombec <i>Sylvietta brachyura</i>	13	15	5	33
Blue-naped Mousebird <i>Urocolius macrourus</i>	18	2	13	33
Little Weaver <i>Ploceus luteolus</i>	16	5	10	31
Icterine Warbler <i>Hippolais icterina</i>	1	1	28	30
Little Stint <i>Calidris minuta</i>	3	24		27
Grey-headed Sparrow <i>Passer griseus</i>	7	11	9	27
Black-billed Wood Dove <i>Turtur abyssinicus</i>	8	12	7	27
Yellow Wagtail <i>M. f. feldegg</i>		22	4	26
Black-headed Weaver <i>Ploceus melanocephalus</i>		11	14	25
Red-billed Quelea <i>Quelea quelea</i>	7	11	7	25
Common Redstart <i>Phoenicurus phoenicurus</i>	12	3	9	24
Red-cheeked Cordon-bleu <i>Uraeginthus bengalus</i>	7	5	10	22
Orange-cheeked Waxbill <i>Estrilda melpoda</i>	4	10	7	21
African Collared Dove <i>Streptopelia roseogrisea</i>	2	1	18	21
Ethiopian Swallow <i>Hirundo aethiopica</i>	7	11	1	19
Zitting Cisticola <i>Cisticola juncidis</i>	1	12	5	18
Willow Warbler <i>Phylloscopus trochilus</i>	5	6	6	17
White-rumped Seedeater <i>Serinus leucopygius</i>	6	11	17	17
Black-headed Gonolek <i>Laniarius erythrogaster</i>	1	10	4	15
Savi's Warbler <i>Locustella luscinoides</i>		11	4	15
Namaqua Dove <i>Oena capensis</i>		3	12	15
Cricknet Warbler <i>Spiloptila clamans</i>	7	4	4	15
White-billed Buffalo Weaver <i>Bubalornis albirostris</i>		3	11	14
Northern Red Bishop <i>Euplectes orix</i>			14	14
Northern Wheatear <i>Oenanthe oenanthe</i>		4	10	14
Greater Painted Snipe <i>Rostratula benghalensis</i>		14		14
Laughing Dove <i>Streptopelia senegalensis</i>	6	4	4	14
Olivaceous Warbler <i>Hippolais pallida opaca</i>		10	3	13
Golden Oriole <i>Oriolus oriolus</i>	12		1	13
Wryneck <i>Jynx torquilla</i>		2	10	12
White-throated Bee-eater <i>Merops albicollis</i>			12	12
Village Weaver <i>Ploceus cucullatus</i>			12	12
Senegal Coucal <i>Centropus senegalensis</i>	5	6		11
Yellow-crowned Bishop <i>Euplectes ater</i>				11
Viellot's Barbet <i>Lybius vielloti</i>	6	4	1	11

Yellow Wagtail <i>M. f. thunbergi</i>			6	5	11
Hoopoe <i>Upupa epops</i>	2	2	7	11	
Woodchat Shrike <i>Lanius senator</i>	1	3	6	10	
Cut-throat <i>Amadina fasciata</i>		2	7	9	
Nightingale <i>Luscinia luscinia</i>				9	9
Turtle Dove <i>Streptopelia turtur</i>				9	9
African Silverbill <i>Lonchura malabarica</i>	2	1	5	8	
Bush Petronia <i>Petronia dentata</i>	3	3	2	8	
Greater Blue-eared Starling <i>Lamprotornis chalybaeus</i>			7	7	
Black-crowned Tchagra <i>Tchagra senegalae</i>	3	4		7	
Little Rush-Warbler <i>Bradypterus baboecala</i>			6	6	
Long-tailed Nightjar <i>Caprimulgus climacurus</i>			6	6	
Didric Cuckoo <i>Chrysococcyx caprius</i>		1	5	6	
Grey Woodpecker <i>Dendrochopus goertae</i>	3	2	1	6	
Black-rumped Waxbill <i>Estrilda troglodytes</i>			6	6	
Crested Lark <i>Galerida cristata</i>		5	1	6	
Red-backed Shrike <i>Lanius colluno</i>			6	6	
Common Bulbul <i>Pycnonotus barbatus</i>	1	1	4	6	
African Mourning Dove <i>Streptopelia decipiens</i>	4		2	6	
Village Indigobird <i>Vidua chalybeata</i>	4		2	6	
Chestnut-backed Sparrow Lark <i>Eremoptenx leucotis</i>	1		4	5	
Gabar Goshawk <i>Micronisus gabar</i>	1	1	3	5	
Spur-winged Plover <i>Vanellus spinosus</i>	2	3		5	
Little Bittern <i>Ixobrychus minutus</i>		3	1	4	
Blue-throat <i>Luscinia svecica</i>		4		4	
Speckle-fronted Weaver <i>Sporopipes frontalis</i>			4	4	
Richard's Pipit <i>Anthus novaeseelandiae</i>		3		3	
Kittlitz's Plover <i>Charadrius pecuarius</i>		3		3	
Fan-tailed Widowbird <i>Euplectes axillaris</i>			3	3	
Chestnut-bellied Starling <i>Lamprotornis pulcher</i>			3	3	
Southern Grey Shrike <i>Lanius mendionalis</i>	1		2	3	
Singing Bush Lark <i>Mirafra cantillans</i>	2	1		3	
Wood Warbler <i>Phylloscopus sibilatrix</i>			3	3	
Orphean Warbler <i>Sylvia hortensis</i>		1	2	3	
Sahel Paradise Whydah <i>Vidua interjecta</i>			3	3	
Shikra <i>Accipiter badius</i>			2	2	
Marsh Warbler <i>Acrocephalus palustris</i>			2	2	
Abyssinian Roller <i>Coracias abyssinica</i>		1	1	2	
Barn Swallow <i>Hirundo rustica</i>	1		1	2	
Tawny-flanked Prinia <i>Prinia subflava</i>			2	2	
Blackcap <i>Sylvia atricapilla</i>	1		1	2	
Green Sandpiper <i>Tringa ochropus</i>		2		2	
Greater Swamp Warbler <i>Acrocephalus rufescens</i>		1		1	
Tree Pipit <i>Anthus trivialis</i>			1	1	
Temminck's Stint <i>Calidris temminckii</i>		1		1	
Klaas's Cuckoo <i>Chrysococcyx klaas</i>			1	1	
Desert Cisticola <i>Cisticola aridulus</i>		1		1	
Black Heron <i>Egretta ardesiaca</i>	1			1	
Black-shouldered Kite <i>Elanus caeruleus</i>		1		1	
African Rock Bunting <i>Emberiza tahapisi</i>			1	1	
Common Kestrel <i>Falco tinnunculus</i>			1	1	
Grey-headed Kingfisher <i>Halcyon leucocephala</i>			1	1	
Masked Shrike <i>Lanius nubicus</i>			1	1	
Isabelline Shrike <i>Lanius isabellinus</i>		1		1	
Standard-winged Nightjar <i>Macropteryx longipennis</i>			1	1	
Carmine Bee-eater <i>Merops nubicus</i>			1	1	
Little Green Bee-eater <i>Merops orientalis</i>	1			1	
Gambaga Flycatcher <i>Muscicapa gambagae</i>			1	1	
Spotted Flycatcher <i>Muscicapa striata</i>			1	1	
Ruff <i>Phylomachus pugnax</i>	1			1	
Black Wood-Hoopoe <i>Phoeniculus aterrimus</i>	1			1	
Bonelli's Warbler <i>Phylloscopus bonelli</i>			1	1	
Whinchat <i>Saxicola rubetra</i>	1			1	
Marsh Sandpiper <i>Tringa stagnatilis</i>		1		1	
Barn Owl <i>Tyto alba</i>	1			1	

Totals

1,359 2,763 1,700 5,822